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1204, Arlington, VA 22202-4302, and to the	Office of Management and Budget, Paperwork	Reduction Project (0704-0	188,) Washington, DC 20503	3.
1. AGENCY USE ONLY (Leave Blan	ik) 2. REPORT DATE	05/12/01	REPORT TYPE AN	ID DATES COVERED
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4. TITLE AND SUBTITLE			5. FUNDING NUMBE	
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			DAAG55-98-1-0432	
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6. AUTHOR(S)				
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P.O. Box 12211			スタロムコ	7 - 1-1
Research Triangle Park, N	C 27709-2211		38962.Z-EL	
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11. SUPPLEMENTARY NOTES				
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Sincerely,

Gabriel M. Rebeiz Professor, EECS Department Univ. of Michigan, Ann Arbor rebeiz@umich.edu

REPORT DOCUMENTATION PAGE (SF298) (Continuation Sheet)

Accomplishments:

We have developed the first MEMS parametric amplifier for Sonar applications. The device used is a MEMS time-varying capacitor which is composed of an array of low-stress metalized silicon-nitride diaphragms, and is pumped by a large signal voltage at 1.64 MHz. This induces a large change in the capacitance, and results in parametric amplification of an input signal at 200 kHz. To our knowledge, this device is the first-ever MEMS mechanical up-converter parametric-effect amplifier developed with an up-conversion ratio of 9:1. The measurements agree very well with theory, including the effect the series resistance and the Q of the MEMS time-varying capacitor. The application areas are in amplifiers which operate at very high temperatures (200-600C), under high particle bombardment (nuclear applications), in non semiconductor-based amplification, and in low-noise systems since parametric amplifiers do not suffer from thermal, shot or {\emptyre multiple problems.}

Publications:

- J.P. Raskin, A.R. Brown, B.T. Yakub and G.M. Rebeiz, "A novel parametric-effect MEMS amplifier," *IEEE Trans. Micro. Electro. Mechanical Systems*, Vol. 9, pp. 528-537, Dec. 2000.
- J.P. Raskin, A.R. Brown, B.T. Khuri-Yakub and G.M. Rebeiz, "Novel parametric-effect MEMS amplifiers/transducers," *Transducers* 2000, Hilton Head, June 2000.

Post-Doctoral Personel Supported:

Jean-Pierre Raskin Andrew Brown